

## Voltage, Current, and Resistance:

### • Voltage:

- Difference in electric potential (objects or locations in same object have different amounts of charge)
- Named after Alessandro Volta (he created the 1st battery!)
- A negative charge (electron) "wants" to move away from other negative charges.
- These repulsive forces get stronger as  $e^-$  get closer to each other.
- Electrons flow from higher potential to lower potential.

$$\emptyset V \rightarrow +5V$$

$$-5V \rightarrow \emptyset V$$

Electrons are negative, so negative numbers are "greater" than positive numbers.

- Electrons flow from negative to positive (less positive to more positive)
- Voltage provides the energy (potential) that pushes and pulls electrons through the circuit.
- Voltage is measured in Volts (V).

- Batteries:

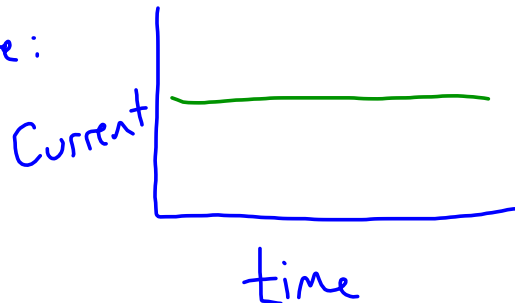
- Have different voltages, and therefore push electrons with different strengths.
- Have positive and negative terminals
- Electrons go from negative to positive

- Current: (electrons)
  - Flow of electric charge
  - Electrons move from negative to positive → Current is defined as positive to negative

- Two types of current:

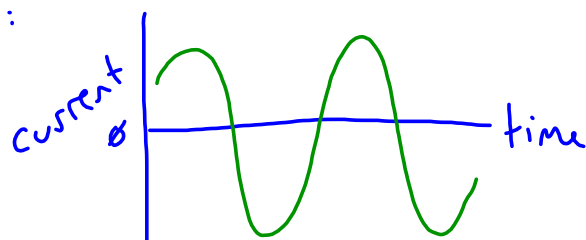
- Direct current (DC) → electrons move from one terminal to other terminal in the same direction

- Picture:



- Alternating current (AC) → current alternates directions at regular intervals

- Picture:



- Resistance:
  - Opposition to electron movement
  - Changes electrical energy into thermal energy and light
  - Resistance is caused by internal friction of the object
  - Conductors have low resistance
  - Insulators have high resistance
  - Two ways to increase resistance:
    1. Make a wire longer.
    2. Make wire thinner